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IS 4410-4 (1982): Glossary of terms relating to river valley projects, Part 4: Drawings [WRD 6: Water Resources Planning, Management and Evaluation]



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“Knowledge is such a treasure which cannot be stolen”

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IS : 4410 (Part IV) - 1982

(Reaffirmed 2001)

Indian Standard

GLOSSARY OF TERMS
RELATING TO RIVER VALLEY PROJECTS

PART IV DRAWINGS

(*First Revision*)

UDC 627·8 : 621·7 : 744·4 : 001·4



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Indian Standard
GLOSSARY OF TERMS
RELATING TO RIVER VALLEY PROJECTS
PART IV DRAWINGS
(First Revision)

Terminology Relating to River Valley Projects
Sectional Committee, BDC 46

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GLOSSARY OF TERMS
RELATING TO RIVER VALLEY PROJECTS
PART IV DRAWINGS
(*First Revision*)

0. FOREWORD

0.1 This Indian Standard (Part IV) (First Revision) was adopted by the Indian Standards Institution on 6 May 1982, after the draft finalized by the Terminology Relating to River Valley Projects Sectional Committee had been approved by the Civil Engineering Division Council.

0.2 A number of Indian Standards have already been published covering various aspects of river valley projects and a large number of similar standards are in the process of formulation. These standards include technical terms, the precise definitions of which are required to avoid ambiguity in their interpretation. To achieve this end, the Terminology Relating to River Valley Projects Sectional Committee is bringing out 'Indian Standard Glossary of terms relating to river valley projects' (IS : 4410) which will be published in parts. This part contains definitions of terms relating to drawings, commonly used in river valley projects.

0.3 This standard was first issued in 1967. The present revision of the standard has been taken up in light of the experience gained during the last few years in use of this standard. This standard incorporates Amendment No. 1 issued to the earliest version of this standard.

0.3.1 In this revision, definitions of many terms have been modified.

0.4 In the formulation of this standard, due weightage has been given to international co-ordination among standards and practices prevailing in different countries, in addition to relating it to the practices in the field in this country. This has been met by deriving considerable assistance from 'Multilingual technical dictionary on irrigation and drainage' published by the International Commission on Irrigation and Drainage and many other sources. All the definitions taken from the 'Multilingual technical dictionary on irrigation and drainage' are marked with an asterisk(*).

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1. SCOPE

1.1 This standard contains definitions of terms relating to lines, scales, types of drawings, sections, projections, perspectives, charts, diagrams and maps, commonly used in river valley projects.

2. TERMS RELATING TO LINES

2.0 Terms relating to lines are defined in **2.1** to **2.9**. For further information reference may be made to **8** of IS : 962-1967†.

NOTE — Other types of lines which are used in maps are defined in **9**.

2.1 Break Line — A line used in drawing to show break of continuity.

2.2 Centre Line — A line on the drawing about which there is full or partial symmetry. Usually it is shown by a line consisting of alternate long and short dashes, closely and evenly spaced, the length of the former being four to six times that of the latter. The centre line projects a short distance outside the outline of the object shown.

2.3 Cutting Plane Line — A line showing the plane in which a section has been taken. It usually consists of a thick long dash and two thick short dashes alternately and evenly spaced with arrows at right angle to the line of cutting plane.

2.4 Dimension Line — A line for indicating a measurement which is denoted by figures in the space left in the dimension line, or above the unbroken dimension line. It usually consists of a thin full line its ends being indicated by arrows or dots.

2.5 Extension Lines — Full lines extending beyond the outline and used where the dimension line is placed outside the object.

2.6 Hachures — Short lines drawn on a map parallel to the direction of slope. They are drawn closest and thickest when the slope is steepest so as to give an effect of relief (*see* Fig. 1).

2.7 Hatching Line — Line used in a drawing to indicate work or materials like brickwork, concrete, etc.

2.8 Hidden Line — Line showing interior or hidden surface. It usually consists of short dashes closely and evenly spaced.

2.9 Leader — A line drawn from note or figure to show where the note or figure applies. It usually consists of a thin straight or curved line ending in an arrow or dot.

†Code of practice for architectural and building drawings (*first revision*).



FIG. 1 HACHURES

3. TERMS RELATING TO SCALES

3.0 Terms relating to scales are defined in **3.1** to **3.3**. For further information reference may be made to **6** of IS : 962-1967†.

3.1 Drawn Scale — A scale actually drawn on the sheet for reference in case of shrinkage or expansion of the sheet due to changes in its moisture content (as distinct from scales only indicated in words). Also called ' Graphic Scale '.

3.2 Dual Scale — A convenient method much used in the case of framed structures. The layout of the centrelines of the members is drawn to one scale, while super-imposing on the drawing the details of members forming the framed structure to a larger scale on the intersection points of these centrelines. Other views of the parts detailed are drawn in convenient positions (see Fig. 2).

3.3 Graphic Scale — See **3.1**.

4. TERMS RELATING TO TYPES OF DRAWINGS

4.1 Amended Drawing — A drawing incorporating changes to the earlier drawing, in respect of general layout or details.

4.2 Assembly Drawing — A drawing to show the construction details of a structure or building; linkages between elements, between elements and components, and between components.

4.3 Design Drawing — The general drawing which defines broadly the layout of the scheme and its component works, and gives broad

†Code of practice for architectural and building drawings (*first revision*).

Scales:

Centre Line of Members = 1 : 20
 Details = 1 : 5

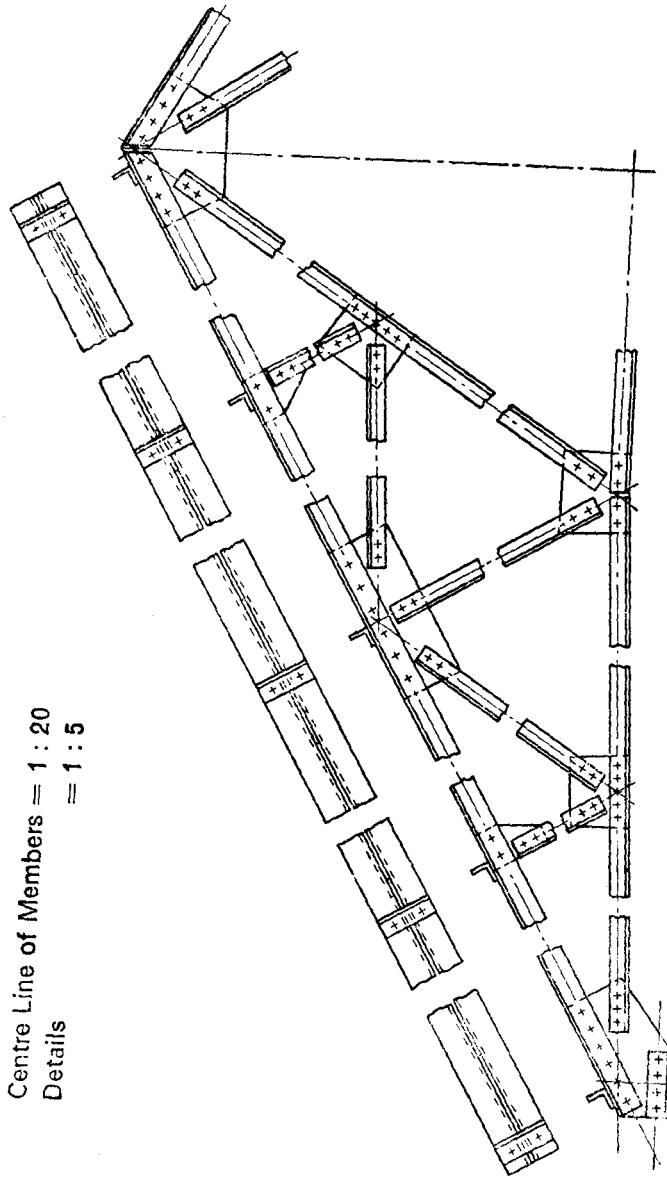


FIG. 2 DUAL SCALE

dimensions of structures or building on which the scope of work can be used, after the general ideas have been determined by freehand sketches and calculations.

4.4 Detail Drawing — Drawing giving the dimensions of separate or component structure and features, details about the materials, reinforcement if necessary, for construction purposes.

4.5 Elevation — The projection of an object on to a vertical plane, for example, front elevation, rear elevation, side elevation, upstream elevation and downstream elevation, depending on the position of the plane on which the projection is taken.

4.5.1 Front Elevation — The projection of an object on a vertical plane, showing the front view of a structure.

4.5.2 Rear Elevation — The projection of a object on a vertical plane, showing the rear view of a structure.

4.5.3 Side Elevation — The projection of an object on a vertical plane, showing the side view of a structure.

4.5.4 Upstream Elevation — The projection of a structure on an upstream vertical plane, showing the upstream view of a structure.

4.5.5 Downstream Elevation — The projection of a structure on a downstream vertical plane, showing the downstream view of a structure.

4.6 Foundation Drawing — A drawing relating to the preparation of a foundation.

4.6.1 Foundation Exploration Drawing — A drawing showing the details of foundation explorations that have been carried out for a project.

4.6.2 Foundation Treatment Drawing — A drawing giving the details of treatment to be adopted on a project.

4.7 Installation Drawing — A drawing containing only particulars relating to the installation or erection of a structure.

4.8 Location Drawings

4.8.1 Block Plans — Drawings to identify sites and locate outline of buildings or structures, in relation to town plan or other wider context.

4.8.2 General Location Drawings — Drawings to show the position occupied by the various spaces in a building or a structure, the general

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construction and location of principal elements, components and assembly details.

4.8.3 Site Plans — Drawings to locate the position of buildings or structures in relation to setting out points, means of access and general layout of site. It may also contain information on services, drainage network, orientation, etc.

4.9 Outline Assembly Drawing* — A drawing to give a general idea of a structure or a machine containing only the principal dimensions.

4.10 Plan — A detailed projection on a horizontal plane of a site, a building or a structure, including installations.

4.11 Preliminary Drawings — Drawings sufficient to serve as a basis for a more definitive drawing, showing the designer's general intentions and giving the scope of work on which to base broadly the estimate of quantities and cost of the work.

4.12 Quotation Drawings — A drawing in amplification of a tender or the submission of quotation.

4.13 Sketch Drawing — Drawings showing only the designer's general intentions.

4.14 Supplementary Drawing — A drawing used to supplement another drawing, for example, a drawing containing additional details for a specific component of the building or structure.

4.15 Tabular Drawing* — The drawing, either assembly or detail, on which the dimension lines are given reference letters and an accompanying table on the drawing lists the corresponding dimensions for a series of sizes of the structural parts or the machine parts.

4.16 View — Representation on a plane of how an observer, situated at infinity and perpendicular to the plane, sees a building, a structure or its part.

4.17 Working Drawings — A set of drawings for the construction of a building or a structure, usually including site drawings, detailed assembly drawings and detailed drawings, completely dimensioned, bearing all the information required for construction and giving details about lifts and embedments, etc.

5. TERMS RELATING TO SECTIONS

5.0 Terms relating to sections are defined in 5.1 to 5.15. For further information reference may be made to 12 of IS : 962-1967†.

5.1 Auxiliary Section* — A sectional view, projected upon an auxiliary plane, to show the shape of surface cut by a plane, or to show the cross-sectional shape of an object.

5.2 Broken Section — See 5.11.

5.3 Cross-Section* — Section cut crosswise or vertically. Also called 'Transverse Section'.

5.4 Detailed Section* — A section similar to a revolved section, except that it does not appear on an external view but, instead is drawn out of place and appears adjacent to it. Also called 'Removed Section'.

5.5 Full Section* — Section in which the cutting plane passes entirely through an object.

5.6 Half Section* — A view which shows half of the object in section and half as elevation or other exterior view.

5.7 Hidden Section* — A regular exterior view upon which the interior construction is emphasized by cross-hatching an imaginary cut surface with dotted section lines.

5.8 Horizontal Section* — Section cut through the object horizontally.

5.9 Longitudinal Section* — Section representing an object as cut through its centre (or as specified) lengthwise and vertically.

5.10 Outline Sectioning* — Shading, stippling, hatching or otherwise emphasizing the section outlined only of very large surface.

5.11 Partial Section* — A view which shows part of the object in section and part in elevation, or other exterior view. Also called 'Broken Section'.

5.12 Removed Section — See 5.4.

5.13 Revolved Section* — Section showing the true shape of the cross-section of some elongated object or some feature of an object shown superimposed on the elevation, that is, as if the section were revolved through 90° on its axis.

†Code of practice for architectural and building drawings (*first revision*).

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5.14 Section* — The description or representation of any object as it would appear if cut through by any intersecting plane, the depiction of which is beyond a plane passing or supposed to pass through an object.

5.15 Transverse Section — *See 5.3.*

6. TERMS RELATING TO PROJECTIONS

6.0 Terms relating to projections are defined in **6.1** to **6.16**. For further information reference may be made to **7** of IS : 962-1967†.

6.1 Auxiliary Projection* — A projection of an object on a plane which is perpendicular to one of the principal planes of projection, and inclined to the other two.

6.2 Axonometric Projection* — The representation of objects by means of their perpendicular projection on a single plane, so placed that rectangular solid projected upon it would show three faces. When all three faces are equally inclined to the plane of projection, so that all the edges and the three principal axes are equally foreshortened, the method is called ' Isometric Projection ' (*see Fig. 3*). It is ' Dimetric Projection ' when only two faces are equally inclined, and ' Trimetric Projection ' when no faces are equally inclined.

6.3 Cabinet Projection — *See 6.11.*

6.4 Cavaliers Projection — *See 6.11.*

6.5 Combination of First and Third Angle Projections — A projection in which the elevation and end views are placed in third angle projection and the plan in the first angle projection (*see Fig. 3*).

6.6 Dimetric Projection — *See 6.2.*

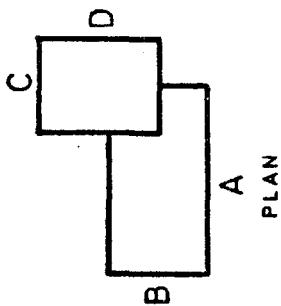
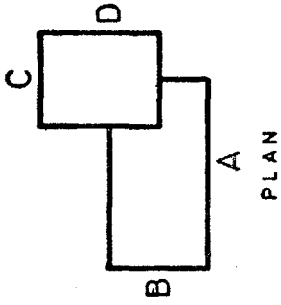
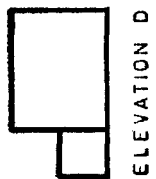
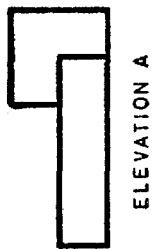
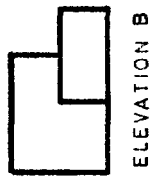
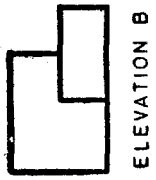
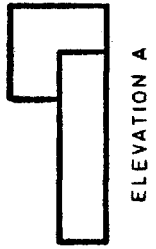
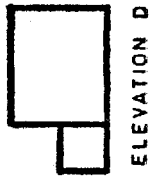
6.7 First-Angle Projection — This is the projection in which each view is so placed that it represents the side of the object remote from it in the adjacent view (*see Fig. 3*).

6.8 Isometric Projection — *See 6.2.*

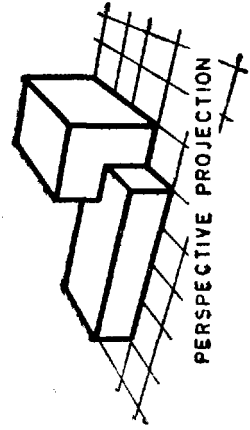
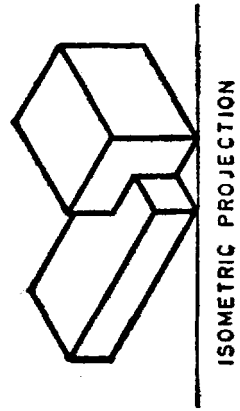
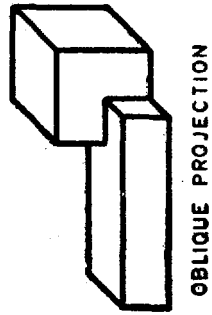
6.9 Multiplaner Projection — *See 6.10.*

6.10 Multiview Projection — A method of projection by means of which the exact shape of an object can be represented by, two or more separate views produced on projection planes which are usually at right angles to each other. It is also called ' Multiplaner Projection '.

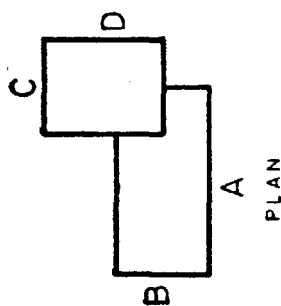
†Code of practice for architectural and building drawings (*first revision*).



COMBINATION OF FIRST AND THIRD ANGLE PROJECTIONS



FIRST ANGLE PROJECTION



THIRD ANGLE PROJECTION

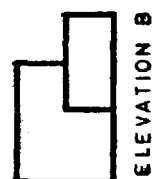
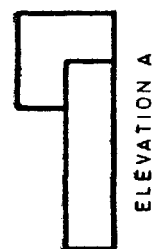
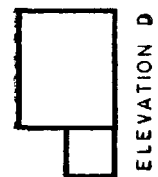


FIG. 3 METHODS OF PROJECTION

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6.11 Oblique Projection* — The representation of objects on a single plane by means of their projections, the projecting lines making angles other than 90° with the plane. The object is usually placed with the front face, or two of the principal axes, parallel to the plane of projection. The angle of the projections with the plane is usually 45° and the drawing is then called a 'Cavaliers Projection'. To overcome the distortion often disagreeably apparent in this projection, dimensions parallel to the third (receding) axis of the object are often arbitrarily shortened to one-half, the projection being then called a 'Cabinet Projection' (*see* Fig. 3).

6.12 Orthogonal Projection — *See* 6.13.

6.13 Orthographic Projection* — Method of representing the exact shape of an object in two or more planes generally at right angles to each other by extending perpendiculars from the object to the planes. The term 'Orthogonal Projection' is sometimes used for this system of drawing.

6.14 Perspective Projection* — The representation of an object on a plane or curved surface as it appears to the eye (*see* Fig. 3).

6.15 Third-Angle Projection — This is the projection in which each view is so placed that it represents the side of the object near to it in the adjacent view (*see* Fig. 3).

6.16 Trimetric Projection — *See* 6.2.

7. TERMS RELATING TO PERSPECTIVES

7.1 Angular Perspective* — Perspective in which some of the principal lines are oblique and some are not. Also called 'Two-Point Perspective'.

7.2 Bird's-Eye Perspective* — Perspective of objects seen from a great height.

7.3 Curvilinear Perspective* — Perspective in which the picture is made on a concave cylindrical surface as in a panorama. Also called 'Cylindrical Perspective' or 'Panoramic Perspective'.

7.4 Cylindrical Perspective — *See* 7.3.

7.5 Diagonal Perspective* — Angular perspective in which the oblique lines make an angle of 45° with the picture plane.

7.6 Linear Perspective* — Perspective projection by means of which a true picture of an object is reduced upon a surface anywhere in space from the actual dimensions on the object, as given in a suitably chosen orthographic projection.

7.7 Oblique Perspective* — Perspective in which all the principal lines are oblique. Also called ' Three-Point Perspective '.

7.8 One-Point Perspective — *See 7.10.*

7.9 Panoramic Perspective — *See 7.3.*

7.10 Parallel Perspective* — Perspective in which the principal lines of the picture are either parallel or perpendicular to the picture plane. Also called ' One-Point Perspective '.

7.11 Three-Point Perspective — *See 7.7.*

7.12 Two-Point Perspective — *See 7.1.*

8. TERMS RELATING TO CHARTS

8.1 Alignment Chart — *See 8.9.*

8.2 Bar Chart* — Chart in which length of each bar is proportioned to the magnitude of the quantity represented (*see Fig. 4*).

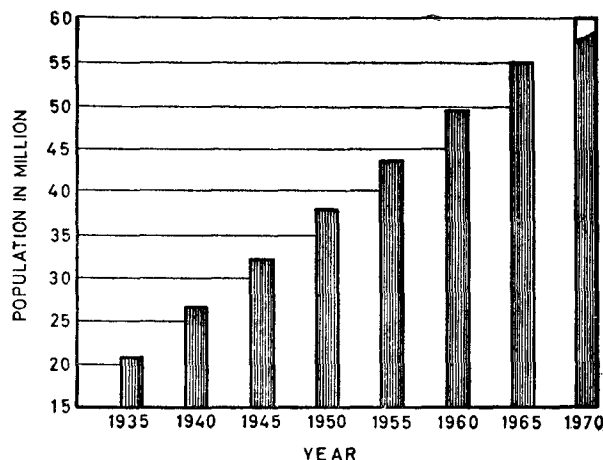


FIG. 4 A TYPICAL BAR CHART

8.3 Classification Chart* — Chart showing the subdivision of a whole, and the inter-relation of its parts to each other.

8.4 Compound Bar Chart* — Bar chart showing two or more components in each bar.

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8.5 Graph — This is a symbolic representation usually by a curve line showing the relationship between two variables.

8.6 Grid Chart — See 8.14.

8.7 Histogram — A frequency diagram in which rectangles proportional in area to the class frequencies are erected on sections of the horizontal axis, the width of each section representing the corresponding class interval of the variate.

8.8 Logarithmic Chart — Chart having both abscissas and ordinates spaced logarithmically.

8.9 Nomogram, Nomograph or Alignment Chart* — A graph, that enables with the aid of a straight edge, to read off the values of a dependent variable when the value of the independent variable is given (see Fig. 5).

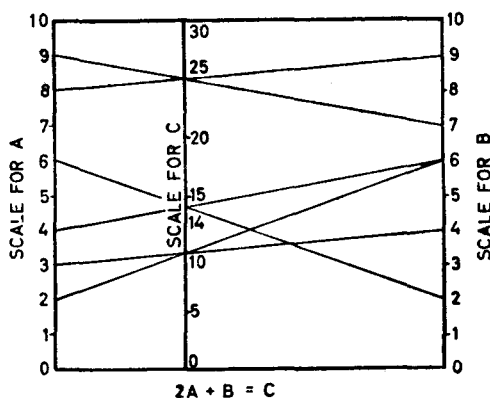


FIG. 5 A TYPICAL NOMOGRAPH

8.10 Pie Chart — A method of diagrammatic representation whereby the components of a single total can be shown as sectors of a circle. The angles of the sectors are proportional to the components of the total. Additional visual aid can be obtained with coloured shading or cross-hatching (see Fig 6).

8.11 Plot* — A diagram drawn to scale showing land boundaries and subdivisions, together with all data essential to the description and identification of the several units shown thereon, and including one or more certificates indicating due approval. A plot differs from a map, since it does not necessarily show additional cultural, drainage and relief features.

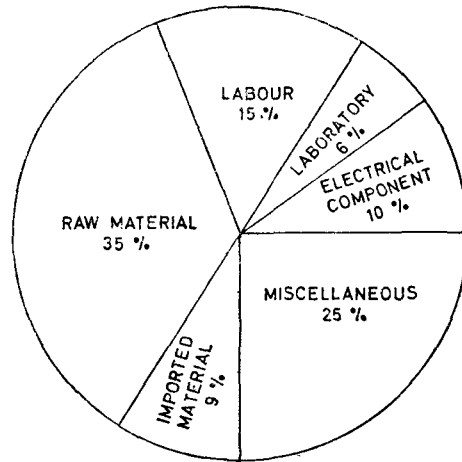


FIG. 6 A TYPICAL PIE CHART

8.12 Polar Chart* — Chart on a polar co-ordinate paper frequently used for representing intensity of illumination, intensity of heat, polar forms of curves, etc. Also called 'Polar Diagram'.

8.13 Polar Diagram — See 8.12.

8.14 Rectilinear Chart* — Chart made on a sheet ruled with equi-spaced horizontal lines crossing equi-spaced vertical lines. Also called 'Grid Chart'.

8.15 Semilogarithmic Chart — A chart having one axis cartesian and other logarithmic.

8.16 Triaxial Diagram — A chart for studying the properties of compounds or mixtures containing three variables. The chart has the form of an equilateral triangular diagram each side being divided into hundred equal parts representing three characteristics of quantity; for example triangular classification chart for soils (see Fig. 7). Also called 'Trilinear Chart'.

8.17 Trilinear Chart — See 8.16.

9. TERMS RELATING TO MAPS

9.1 Contour — An imaginary line on the ground, all points on which are at the same geospherical elevation above a specific datum, usually mean sea level.

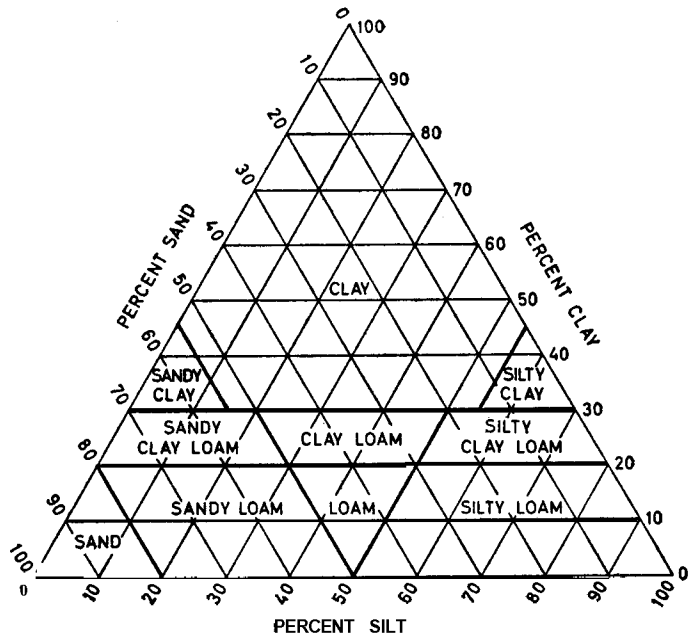


FIG. 7 A TYPICAL TRIAXIAL DIAGRAM

9.2 Contour Interval* — The difference in elevation between the adjacent contours on a map.

9.3 Contour Map — A map showing the configuration of the ground or terrain by means of contour lines drawn generally at regular intervals of elevation.

9.4 Engineering Map — Working maps for engineering projects which are designed for specific purposes to aid construction.

9.5 Geographic Map — A small scale general map of a large area depicting natural and manmade features, for example, cities, roads, railways, streams, open water bodies, embankments, canals, dams, administrative and international boundaries, names, relief, etc, in a generalised form together with latitudes and longitudes.

9.6 Geologic Map — A map which shows the boundaries and distribution of rock formations, geologic structures, strikes and dip, ore bearing formations, quarries, etc.

9.7 Hydroisopleth Map — A map showing fluctuation of the underground water table with respect to time and space.

9.8 Hydrographic Map* — A map showing information concerning bodies of water, such as shore lines, sounding depths, subaqueous contours, navigation aids and water control measures.

9.9 Index Map — A small scale skeleton map of a large area, generally used for depicting the location of a project on a large scale map.

9.10 Isohyet — A line connecting points of equal precipitations. Also called ' Isohyetal Line ' or ' Isopluvial Line '.

9.11 Isohyetal Line — *See* 9.10.

9.12 Isopluvial Line — *See* 9.10.

9.13 Isohyetal Map — A map showing lines of equal precipitation or isohyets over an area during a given period. Also called ' Isopluvial Map '.

9.14 Isopiestic Line — A line on a map connecting all points of equal elevation, to which water pressure in a water-bearing formation would rise if free to do so; a line connecting all points of equal pressure in a water-bearing formation under pressure; or a line connecting all points of equal altitude on the upper surface of an unconfined aquifer.

9.15 Isopiestic Map — A map showing isopiestic lines.

9.16 Isopluvial Map — *See* 9.13.

9.17 Land Use Map — A map showing the use of the land or area at a time.

9.18 Mosaic or Photo Mosaic — An aerial mosaic is an assembly of aerial photographs, the edges of which have been cut and matched to form a continuous photographic representation of a portion of the earth's surface. A controlled mosaic is one which is oriented and scaled to horizontal ground control.

9.19 Photogrammetric Map — A map depicting topographical and other features of a part of the earth's surface, prepared by measurement from photographs of the area taken with cameras or other photographic sensors mounted in an aircraft.

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9.20 Photo Index Map — A map on a suitable scale depicting position and coverage on the territory of every photograph of an assembly of adjoining aerial or satellite imagery of about the same photo scale.

9.21 Planimetric Map* — A map which presents the horizontal positions only for the features represented, distinguished from a topographic map by the omission of relief in measurable form. The natural features usually shown on a planimetric map include rivers, lakes, mountains, valleys, plains, forests, prairies, marshes and deserts. The culture features include cities, farms, transportation routes, public utility facilities, political and private boundary lines.

9.22 Relief Map — A map incorporating vertical dimension of the ground or terrain, for example, hills, mountains, valleys, by means of hectors, contours, hill shading or by combination of these methods.

9.23 Satellite Map — A map depicting topographical and other features of a part of the earth's surface, prepared by measurement from imagery of the area taken using sensors mounted on a satellite.

9.24 Soil Map — A map showing different types of soils in an area and is useful for agricultural, irrigation and engineering purposes.

9.25 Synoptic Weather Map — A map showing the weather conditions prevailing over an area at a given time.

9.26 Topographic Map — A general map on sufficiently large scale, showing all important features and relief on which individual ground features can be identified by their shape and position.

9.27 Vicinity Map — A general map depicting pertinent information of an area in the vicinity.

9.28 Water Table Map — A contour map of the upper surface of the zone of saturation (*see also 9.15*).

9.29 Weather Map — A map showing the conditions of the principal meteorological elements at a given time.

10. SYMBOLS IN MAPPING




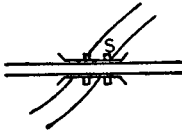
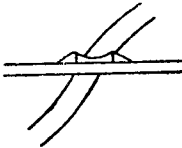
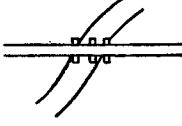





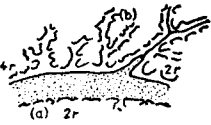
10.1 In addition to symbols for land surveying given in Fig. 20 of IS : 962-1967†, the symbols given in Appendix A may be used in the maps for river valley projects.

†Code of practice for architectural and building drawings (*first revision*).

APPENDIX A

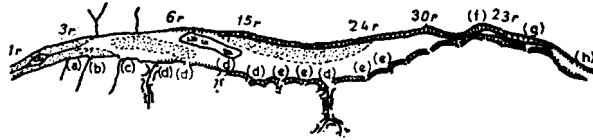
(Clause 10.1)

SYMBOLS IN MAPPING

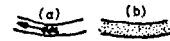
1. Airfield (intersection of lines indicates location) 
2. Helicopter landing field 
3. Prohibited flying area 
4. Truss bridge (S = Steel
W = Wood) 
5. Suspension bridge 
6. Arch bridge 
7. Factory chimney 
8. Watch-tower 
9. Oil-well 
10. Oil-tank 
11. Mine-shaft 
12. Dry nala (a) with broken ground along bank (as surveyed)
(b) ravines (as surveyed) 

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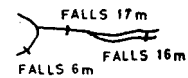
13. Stream bank, north bank shows continuous, unbroken, steep or precipitous bank from 1 m to 30 m or over in height and south bank shows the same, but broken, as surveyed. Heights corresponding with those on the north bank: (a), (b) and (c) show treatment of side stream junctions in accordance with the extent to which the river bank is broken, (d) breaks in banks that extend down to river bed level, (e) small breaks that have not been eroded down to river bed level, (f), (g) and (h) types of gorges or narrow rivers with high banks



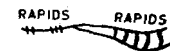
14. Double-line stream (a) perennial, with arrow showing direction of flow, (b) dry with sandy beds



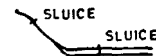
15. Water fall with height (perennial and non-perennial)



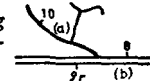
16. Rapids



17. Sluice



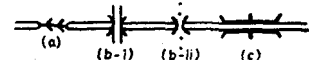
18. Perennial or non-perennial canals (a) single line (thickness according to importance) (b) double line according to width and with embankment shown by relative height



19. Canals disused or under construction with appropriate descriptive remark (thickness of the lines according to importance)



20. Canal: (a) with navigation lock (b) with lock or weir carrying (i) road (ii) foot-path (iii) aqueduct



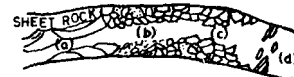
21. Dam or weir



22. Sand river bed showing: (a) perennial channels (b) non-perennial channels



23. River-bed showing: (a) sheet rock (b) rounded rocks (c) edged rock (d) rock ribs



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24. Heights:	
a) Triangulation station	Δ 200
b) Triangulation intersected point or permanent transverse station or intersected point with ground level accurately fixed or measured	.200
c) Approximate	.200
d) Relative	.20r
25. Bench Mark:	
a) Geodetic	.BM 63 3
b) Tertiary	.BM 63.3
c) Canal	.63.3
26. Post Office	PO
27. Telegraph Office	TO
28. Combined Post & Telegraph Office	PTO
29. Police Station	PS
30. Dak or Travellers Bungalow†	DB
31. Rest House†	RH
32. Inspection Bungalow†	IB
33. Circuit House†	CH
34. Camping Ground	CG
35. Railway Station	RS
36. Reserve Forest	RF
37. Protected Forest	PF

†The name of the department that maintains the building may be given in brackets.

INDIAN STANDARDS

ON

TERMINOLOGY RELATING TO RIVER VALLEY PROJECTS

IS:

4410-1967 Glossary of terms relating to river valley projects:

- (Part I)-1967 Irrigation practice
- (Part II)-1967 Project planning
- (Part III)-1967 River and river training
- (Part IV)-1982 Drawings (*first* revision)
- (Part V) Canals
- (Part VI)-1968 Reservoirs
- (Part VII) Engineering geology
- (Part VIII)-1968 Dams and dam section
- (Part IX) Spillways and syphons
- (Part X)-1969 Civil works of hydro-electric generation system including water conductor system
- (Part XI) Hydrology
 - (**Sec 1**)-1972 General terms
 - (**Sec 2**)-1972 Precipitation and run off
 - (**Sec 3**)-1973 Infiltration and water losses
 - (**Sec 4**)-1973 Hydrographs
 - (**Sec 5**)-1977 Floods
- (Part XII)-1973 Diversion works
- (Part XIV) Soil conservation and reclamation
 - (**Sec 1**)-1977 Soil conservation
 - (**Sec 2**)-1977 Reclamation
- (Part XV) Canal structures
 - (**Sec 1**)-1973 General terms
 - (**Sec 2**)-1973 Transitions
 - (**Sec 3**)-1977 Flumes
 - (**Sec 4**)-1977 Regulating works
 - (**Sec 5**)-1977 Cross drainage works
- (Part XVI) Gates and valves
 - (**Sec 1**)-1977 Gates
 - (**Sec 2**) Valves
- (Part VII)-1977 Water requirements of crops

INTERNATIONAL SYSTEM OF UNITS (SI UNITS)

Base Units

QUANTITY	UNIT	SYMBOL
Length	metre	m
Mass	kilogram	kg
Time	second	s
Electric current	ampere	A
Thermodynamic temperature	kelvin	K
Luminous intensity	candela	cd
Amount of substance	mole	mol

Supplementary Units

QUANTITY	UNIT	SYMBOL
Plane angle	radian	rad
Solid angle	steradian	sr

Derived Units

QUANTITY	UNIT	SYMBOL	DEFINITION
Force	newton	N	1 N = 1 kg.m/s ²
Energy	joule	J	1 J = 1 N.m
Power	watt	W	1 W = 1 J/s
Flux	weber	Wb	1 Wb = 1 V.s
Flux density	tesla	T	1 T = 1 Wb/m ²
Frequency	hertz	Hz	1 Hz = 1 c/s (s ⁻¹)
Electric conductance	siemens	S	1 S = 1 A/V
Electromotive force	volt	V	1 V = 1 W/A
Pressure, stress	pascal	Pa	1 Pa = 1 N/m ²

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